REMARKS

2) Regarding claims 1 and 27, Luo teaches a method and apparatus for receiving light into a photodetector directly from an optical fiber. Please note the following paragraphs:

[0006] In an exemplary embodiment of the present invention, an optical receiver includes a photodetector, adapted to receive an incoming optical signal from a fiber ....

[0007] In another aspect of the present invention, an optical receiver includes a housing adapted to receive a distal end of a fiber ....

[0008] In another aspect of the present invention a method for receiving a high speed optical signal includes the steps of COUPLING a distal end of an optical fiber .....

[0009] In a further aspect of the present invention an optical receiver includes a housing adapted to receive a distal end of a fiber, a focusing lens, ...

In no instance does Luo suggest, as it is not possible, for light to emanate from a photodetector and return to the optical fiber. A key feature of the instant invention is the use of a "waveguide grating coupler" so that light may be coupled "between an optical fiber and a substrate" as stated in claim 1. Luo uses the term "waveguide" four times in the specification in paragraphs [0002], [0003] and [0070]; in all cases he is referring to an optical fiber; in no case is Luo using the term waveguide to refer to a thin film waveguide on an integrated circuit. Luo does not use the term "grating" in his application. Applicant disagrees with Examiner that Luo discloses any apparatus or method comprising a waveguide grating coupler.

3) Regarding claim 2, applicant agrees that Luo discloses the reflection of light being totally internally reflected. However the apparatus of Luo and the apparatus of the instant invention are distinctly different. A key feature of the instant invention is the use of a "waveguide grating coupler" so that light may be coupled "between an optical fiber and a substrate" as stated in claim 1. Applicant disagrees with Examiner that Luo discloses any apparatus or method comprising a waveguide grating coupler.

4) Regarding claims 3 and 29, Luo's [0035] refers to different ways to attach a photodetector to a circuit board. [0040] discusses a conductive epoxy for mounting a circuit board onto the bottom

plate. [0041] discusses metallizing a portion of the fiber for soldering purposes. Luo mentions "reflective" twice; once in claim 33 "... at least a portion of said fiber guide is coated with a REFLECTIVE coating." and once in [0082] "One of skill in the art will appreciate that if desired the fiber guide may be coated with a REFLECTIVE coating to ensure total internal reflection of the rays propagating within the fiber guide." The "reflective surface" of claim 3 is clearly identified in [0014] of the instant invention as 115 in Figure 1, being the cut surface at an angle A. No reference is made or suggested by Luo that this surface should be coated.

5) Regarding claims 4 and 5, Luo's [0006 -0008] do not mention a metal; [0031] states; "wire bonds may be formed from aluminum or gold ....". [0038] discusses contacting the photodetector with ohmic contacts. [0039] discusses alternative photodetectors. As mentioned previously applicant is unable to find where Luo teaches or implies that a flat reflective surface is coated with a metal.

6) Regarding claims 6 - 8, Luo's [0006 -0008] do not mention light reflecting off the reflective surface. [0042] states, "... the angle of the fiber end face is preferably greater than about eight degrees...."; no comments on light reflecting.

[0043] states, "....the end face of the fiber is slanted at an angle that is less than the critical angle for total internal reflection and is preferably in the range of about 40-55 degrees. Reflections off the end face of the fiber create a divergent reflected beam whose width increases with increasing distance from the slanted end face 100 of the fiber.". In this case the "Reflections off the end face" is a "reflected beam" diverging "with increasing distance" back into "the fiber". There is no mention of propagating to the substrate or even a photodetector.

[0051] discusses the advantage of reducing the cladding material thickness to allow closer coupling to the photodetector. [0060] teaches a method to optimize fiber optic parameters and photodetector size for an optical interface. Luo does not teach any art with regard to waveguide grating couplers.

7) Regarding claims 9, 30 and 38, Luo does not teach or suggest "a flat section on the cladding .... is aligned adjacent to and on top of the waveguide grating coupler," as stated in applicant's claim 9, implied in claim 30 and stated again, somewhat differently, in claim 38.

8) Regarding claim 10, in Luo's claim 25 " a focusing lens" is part of an optical receiver; in claim 26 the focusing lens is a ball lens; in claim 31 the focusing lens is an aspherical lens. Figure 12 of Luo has element 604 showing a representative Ball lens. The instant invention contains no discrete lens as taught by Luo. Note [0023] of applicant's specification, "Light 121 is also astigmatic, because the cladding and air interface as seen in Figure 3 forms a cylindrical lens." Claim 10 claims a feature, "a stigmatic lens" formed in the flat section on the cladding; Luo does not teach or suggest this embodiment.

9) Regarding claims 11 – 16 and 32 -37, Luo teaches having a fiber 60 in a sleeve 58 in a housing [0041]. In [0042] "The cross section of FIG. 4 illustrates a conventional LENS free interface between a photodetector and a fiber..." . Luo maintains the fiber apart from the photodetector physically or by the use of a discrete lens. The instant invention teaches to bond an optical fiber mechanically to a substrate which comprises a waveguide grating coupler in optical communication with the fiber. Luo does not teach or suggest this embodiment.

10) Regarding claims 17 – 19, please note, the word pedestal does not appear in the Luo application. Luo teaches attaching a photodetector to a circuit board and a sleeve to hold a fiber.

11) Regarding claim 24, please note the Luo application never uses the word polarization. Luo does not teach or suggest an optical fiber, of any type, communicating optically with a waveguide grating coupler. Please note Examiner's comment following claims 25 and 39 on pg. 6: "... Luo does not disclose a PMF fiber...". Applicant has amended claim 24.

12) Regarding claim 26, Luo teaches an optical fiber and a receiver such as a photodetector; Luo teaches a silicon substrate forming a mechanical support, a V groove, for a fiber. Luo's application does not mention sapphire or monocrystalline or dielectric.

Luo does not teach or suggest the use of any active device other than a photodetector in combination with an optical fiber.

13) Regarding claim 28, claim 23 of Luo states, " The method of claim 19 wherein the step of removing a portion of the cladding material along said reflected optical path comprises polishing said fiber along said reflected optical path to reduce thickness of cladding to a range of about 1-5 .□m." Luo teaches polishing the cladding not the reflective surface; in [0042] states: "as is known in the art the end face may be ... polished to provide a desired end face angle.". However, no one has taught or suggested the use of a polished fiber in optical communication with a waveguide grating coupler.

14) Regarding claim 31, applicant respectfully disagrees with Examiner; Luo never teaches or suggests the use of a waveguide grating coupler in optical communication with an optical fiber.

15) Regarding claims 20 - 23, applicant respectfully disagrees with Examiner; Luo never teaches or suggests the use of a waveguide grating coupler in optical communication with an optical fiber. Applicant has amended claims 20 - 23 to incorporate an active alignment system as described in the specification.

16) Regarding claims 25 and 39, applicant respectfully disagrees with Examiner; Hoose teaches a multi-wavelength external cavity laser system; there is no "surface of the substrate" for a mode to be parallel to. The Hoose invention bears no relationship or bearing on applicant's invention. Applicant has amended claims 25 and 39 to incorporate an alignment tolerance as described in the specification. Hoose does not teach an alignment tolerance.

CONCLUSION

Applicants have corrected the omission in the specification and amended claims as requested by Examiner. Applicants have addressed Examiner's issues with regard to the claims and believe the claims are in condition for allowance, and thus, allowance of the claims is requested.

Respectfully submitted,

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